THE DENVER ENGINEERING WORKS COMPANY

SHEPARD AND SEARING

BULLETIN No. 1033 **AUGUST 1, 1907**

GEARS

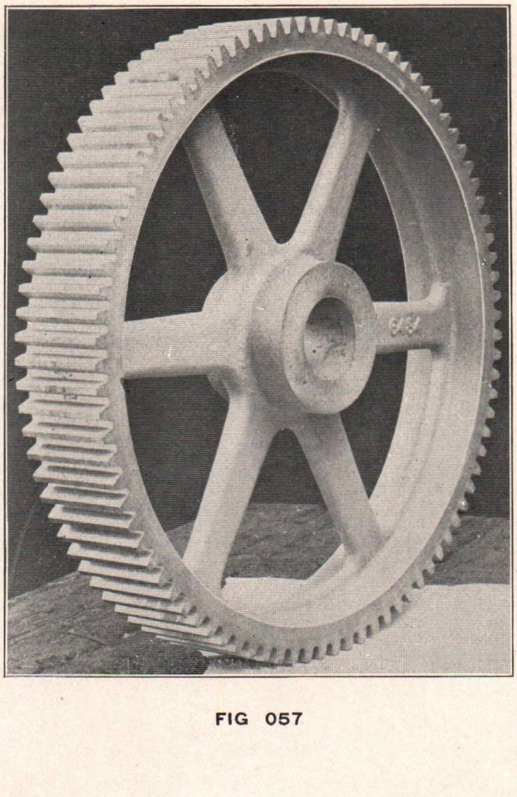


FIG 057

GEARS AND GEAR CUTTING

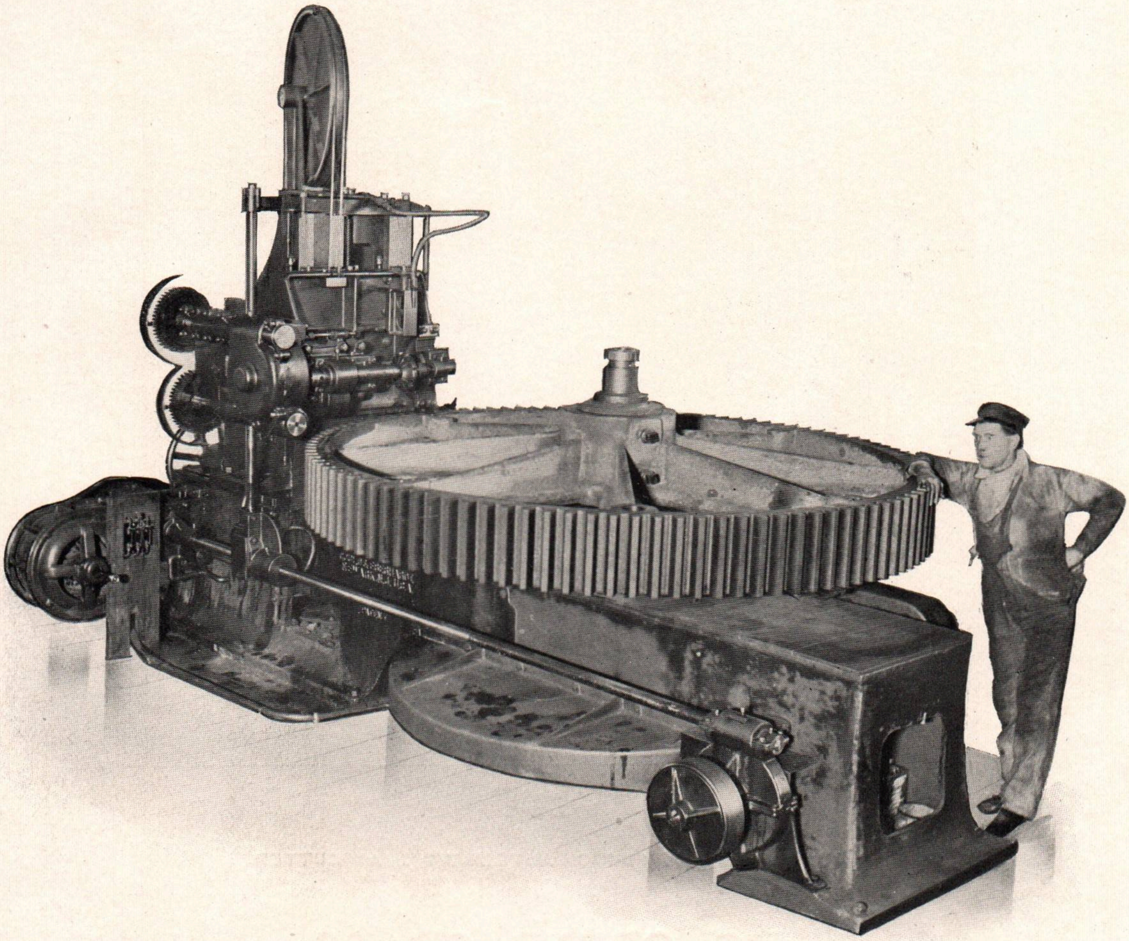


FIG. 590

SECOND LARGEST AUTOMATIC GEAR CUTTING MACHINE IN THE U S. AS IT APPEARS IN OPERATION IN OUR WORKS. CAPACITY 144-INCH DIAMETER BY 20-INCH FACE.

We have what we believe to be the largest assortment of gear patterns owned by any mining-machinery manufacturer in this section of the country. We have the second largest Automatic Gear-Cutting Machine in the United States.

This bulletin contains a complete list of our patterns of cast gears of all types, and includes Spur, Finger Tooth, Bevel, Mitre, Worm Wheels and Worms, Internal Spur and Elliptical Gears.

It also contains a list of machine-cut Spur Gears and Worm Wheels and Worms.

You will find that our cut gears are the best, because we have a separate cutter for every pitch and every diameter, and do not use an "average cutter" which is not exactly right for any tooth.

We are prepared to make any special gear of any form or tooth outline.

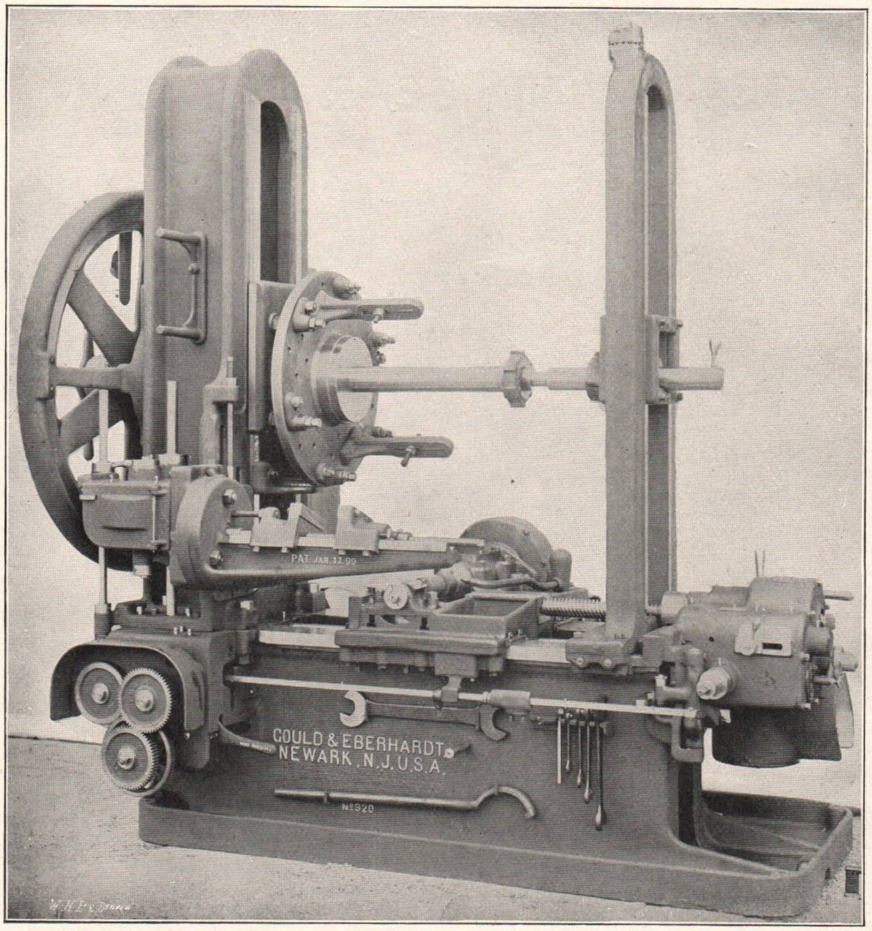


FIG. 056

OUR 89-INCH BY 16-INCH AUTOMATIC GEAR CUTTER.

TO ORDER GEARS

IN ORDERING GEARS ALL ESSENTIAL DETAILS SHOULD BE GIVEN, AND SHOULD CONTAIN THE FOLLOWING:

MATERIAL—Brass, Cast Iron, Steel, Fibre, Rawhide, etc.

STYLE—Plain, Webbed or with arms.

KIND OF GEAR—Spur, Bevel, Ratchet, etc.

PITCH—Diametral, Circular or Chordal Pitch. Our cut gears are all diametral pitch. Our cast gears are circular pitch.

NUMBER OF TEETH—

STYLE OF TOOTH—Our cast gears have epicycloidal teeth with the exception of the finger tooth gears, which have special long teeth for use on crushing rolls, allowing for considerable variation between centers. Our cut gears have standard Brown & Sharp involute teeth.

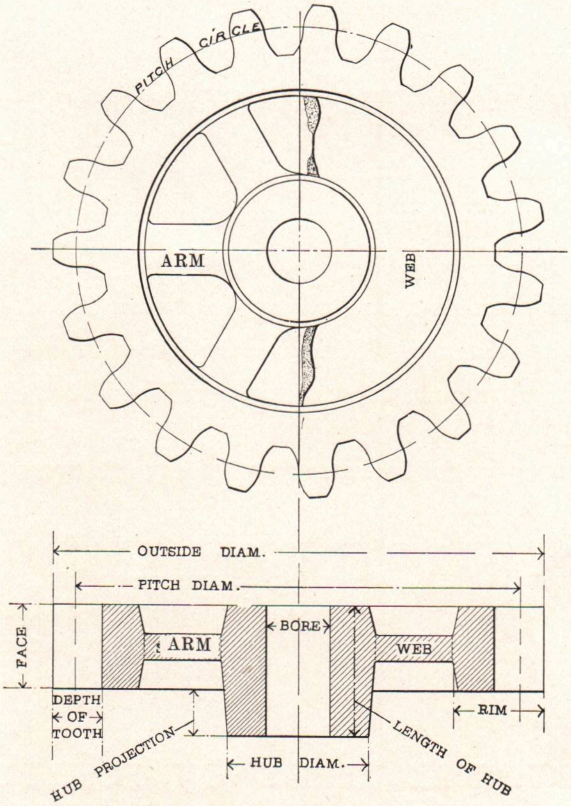


FIG. 055.

FACE OF GEAR—

DIAMETER OF HOLE OR BORE FOR SHAFT—

FINISHED HOLE, OR CORED FOR YOU TO FINISH—In each case give size of finished hole.

HUB—Length, if special; whether it extends on both sides or one, and how much.

DISTANCE BETWEEN CENTERS—If gears are to run together—*i. e.*, mesh with each other.

KEYWAY OR SET SCREW—If any, and also state on which end of hub is deep side of keyway.

FEATHERWAY OR KEYWAY—A featherway is straight—*i. e.*, all sides are parallel. A keyway is tapered on the side opposite the shaft.

FINISH REQUIRED—Ends of hubs and sides of rim. All cut gears are finished on ends of hub and sides of rim. Cast gears are finished only when specified.

PURPOSE AND SPEED, UNLESS ORDINARY—

CAST OR MACHINE-CUT TEETH—

SHROUDED OR NOT—Cast gears, rawhide and fibre gears only can be made with shroud or flange at sides of rim.

SIZE OF KEY AND KEYWAY—Standards differ—see ours on page 18.

DUPLICATE OF GEARS YOU HAVE—When you wish us to make a gear similar to one you have you may not be able to get the accurate pitch diameter or the form of tooth. In that case give us the outside diameter of the gear and take an impression of the teeth by pressing a piece of paper against the side of the rim and rubbing the back of the paper. The grease or oil from the teeth will make the impression.

KEYWAYS—Are never cut unless ordered.

KEYS AND SET SCREWS—Are not furnished unless ordered and are extra.

BLANKS—Sent to us to be cut are assumed to be of proper shape, and we cannot be responsible for any trouble due to wrong sizes.

DIAMETER—By this term we always understand that *pitch* diameter is meant.

HUBS—Unless specified, we shall make the hubs as we see fit.

RACKS—Are liable to be bent in cutting away the metal for the teeth.

Telephonic or telegraphic orders should always be confirmed by letter.

Any changes made in the gears as listed increase the cost and cause delay in shipping.

If details are not clearly given our estimate or your order will be delayed, as we shall be obliged to wait until we obtain the full information.

We have the best facilities for cutting spur gears of any size up to 12 feet outside diameter by 20 inches face.

On pages 11 to 13 is a list of machine-cut spur gears for which we have patterns. We can cut teeth of a finer pitch than given or can make gears with narrower face, using the same patterns. In a few cases it is possible to cut teeth of a courser pitch, but we would request that the case be referred to us, giving the speed at which the gear is to run, and the power it is to transmit, so that we can determine whether the gear will be strong enough.

TECHNICAL TERMS AND FORMULAE

The Diameter of a gear is understood to be the Pitch Diameter.

Diametral Pitch of a gear is the number of teeth per inch of diameter. Thus a gear 10 inches in diameter, having 50 teeth, has 5 teeth per inch of diameter, and is 5 Diametral Pitch.

Circular Pitch is the distance between the centers of two contiguous teeth, measured on the pitch circle. Thus, when the distance from the center of one tooth to the center of the next on a gear measures 1 inch, the gear is 1 inch Circular Pitch.

The relation between circular and diametral pitch and pitch diameter may be expressed as follows:

$$\text{Diametral Pitch} = \frac{\text{Number of Teeth}}{\text{Pitch Diameter in Inches}} = \frac{3.1416}{\text{Circular Pitch}}$$

$$\text{Circular Pitch} = \frac{\text{Diameter} \times 3.1416}{\text{Number of Teeth}} = \frac{3.1416}{\text{Diametral Pitch}}$$

$$\text{Pitch Diameter} = \frac{\text{Number of Teeth}}{\text{Diametral Pitch}} = \frac{\text{Circular Pitch} \times \text{No. of Teeth}}{3.1416}$$

Diametral Pitch, used on our cut gears, represents the number of teeth for every inch of pitch diameter; therefore, from the above formula—

To find Diametral Pitch:
Divide the number of teeth by the pitch diameter.
Divide the number of teeth plus two by the outside diameter.

To find the Pitch Diameter:
Divide the number of teeth by the Diametral Pitch.

When the number of teeth and the diametral pitch are known, the outside diameter (that is, the diameter of the blank) can be found by adding 2 to the number of teeth and dividing by the diametral pitch. For example, a gear having 50 teeth and 10-inch pitch diameter will have an outside diameter $= \dfrac{50 + 2}{5}$ or 10.4″

Conversely, when the number of teeth and outside diameter are given, the diametral pitch can be found by adding 2 to the number of teeth and dividing by the outside diameter.

The thickness of a tooth at the pitch line is one-half the circular pitch, or 1.57 divided by the diametral pitch less a small amount for clearance. This clearance is about one-twentieth of the circular pitch.

HORSE POWER OF GEARING

Many formulæ and rules exist purporting to give the strength of gear teeth and horse-power that may be transmitted by them; but, as this depends upon so many and uncertain factors, it is not surprising that the formulæ and rules given by the different writers show a wide variation. In fact, to make a practical and economical solution of a gear problem requires considerable experience and judgment. We therefore cannot in justice publish any one formula or rule, and we have not the space to publish all.

We, however, take much pleasure in offering our services in the solution of any gear problem which may be presented to us.

MAXIMUM SPEED OF GEARING

Ordinary gearing with cast-iron teeth, 1,800 ft. per minute.

Cast-iron gearing with accurate, machine-cut teeth, 3,000 ft. per minute.

Ordinary gearing with cast-iron teeth should not run over 1,200 ft. per minute to avoid great noise.

EFFICIENCY OF GEARING

Efficiency of machine-cut spur gearing, if well lined up and not overloaded, will be as high as 98%, and under ordinary circumstances can safely be taken at 96%.

Cast-tooth gearing, under favorable conditions, shows an efficiency of 95%. A safe figure under ordinary conditions is 90%.

RELATIVE SPEED OR GEAR RATIO

The following rules can be used to determine the relative speeds and the number of teeth for two gears working together:

1. $\text{Revolutions of Driving Gear} = \dfrac{\text{No. of Teeth} \times \text{Revs. of Driven Gear}}{\text{No. of Teeth of Driving Gear}}$
2. $\text{Revolutions of Driven Gear} = \dfrac{\text{No. of Teeth} \times \text{Revs. of Driving Gear}}{\text{No. of Teeth of Driven Gear}}$
3. $\text{No. of Teeth in Driving Gear} = \dfrac{\text{No. of Teeth} \times \text{Revs. of Driven Gear}}{\text{Revs. of Driving Gear}}$
4. $\text{No. of Teeth in Driven Gear} = \dfrac{\text{No. of Teeth} \times \text{Revs. of Driving Gear}}{\text{Revs. of Driven Gear}}$

FULL-SIZE ILLUSTRATIONS OF GEAR TEETH

The following illustrations give the actual sizes of involute teeth from 1 to 48 diametral pitch. These are the standard sizes and forms used for our machine-cut gears.

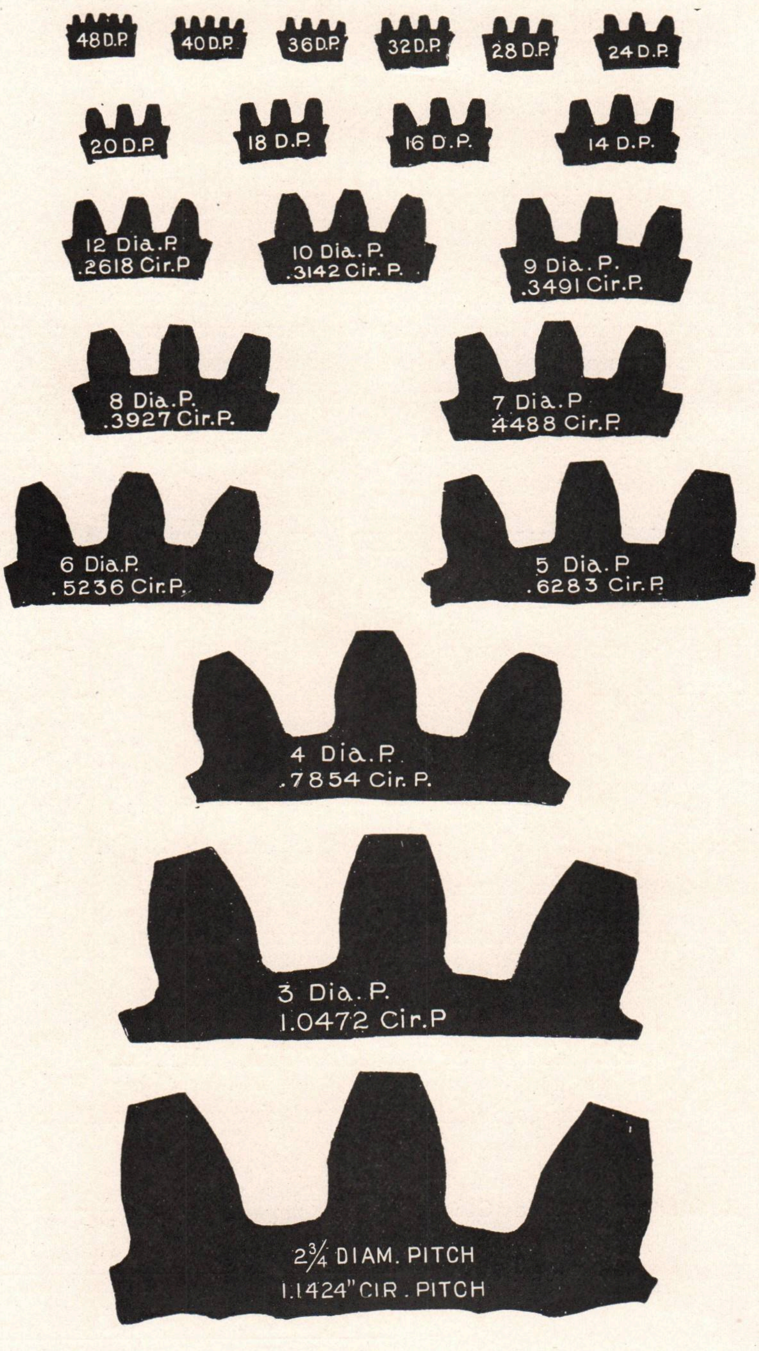


FIG. 052

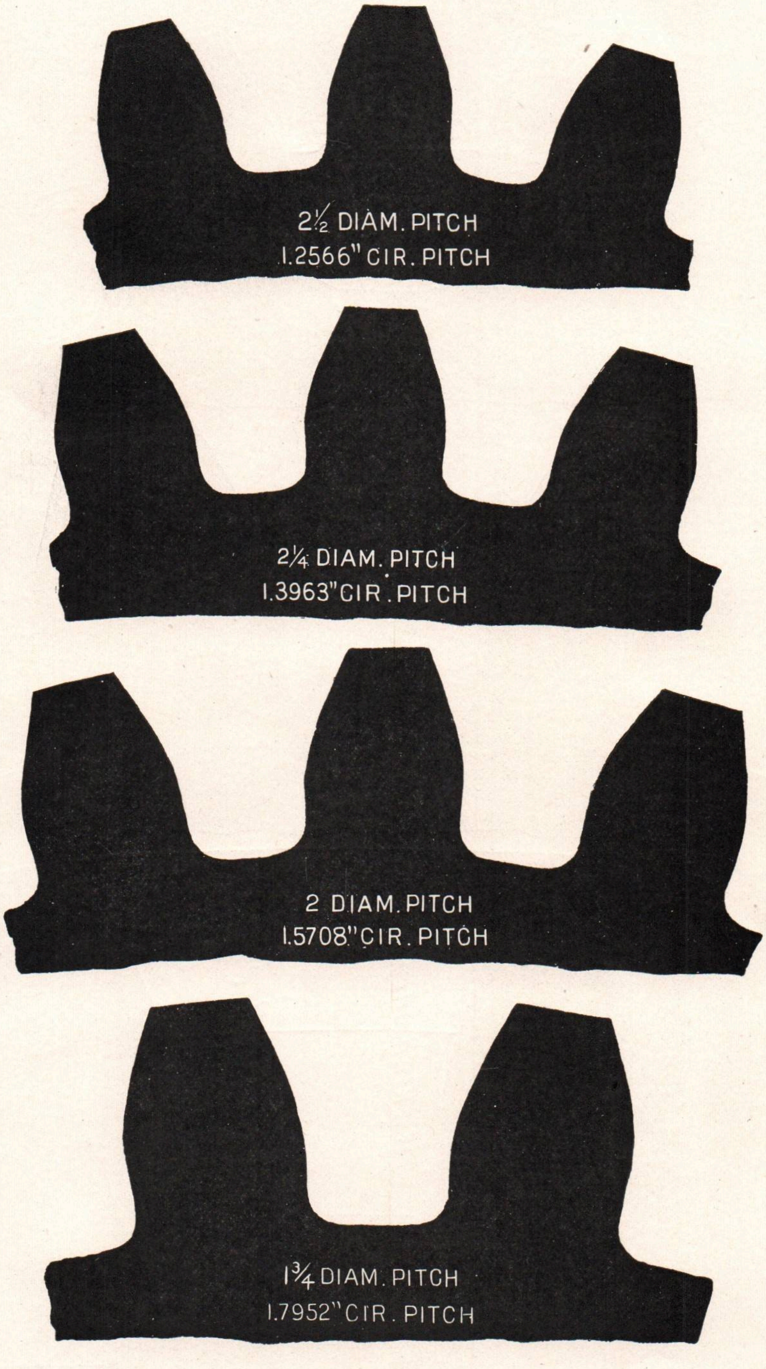

2½ DIAM. PITCH
1.2566" CIR. PITCH
2¼ DIAM. PITCH
1.3963" CIR. PITCH
2 DIAM. PITCH
1.5708" CIR. PITCH
1¾ DIAM. PITCH
1.7952" CIR. PITCH

FIG. 053

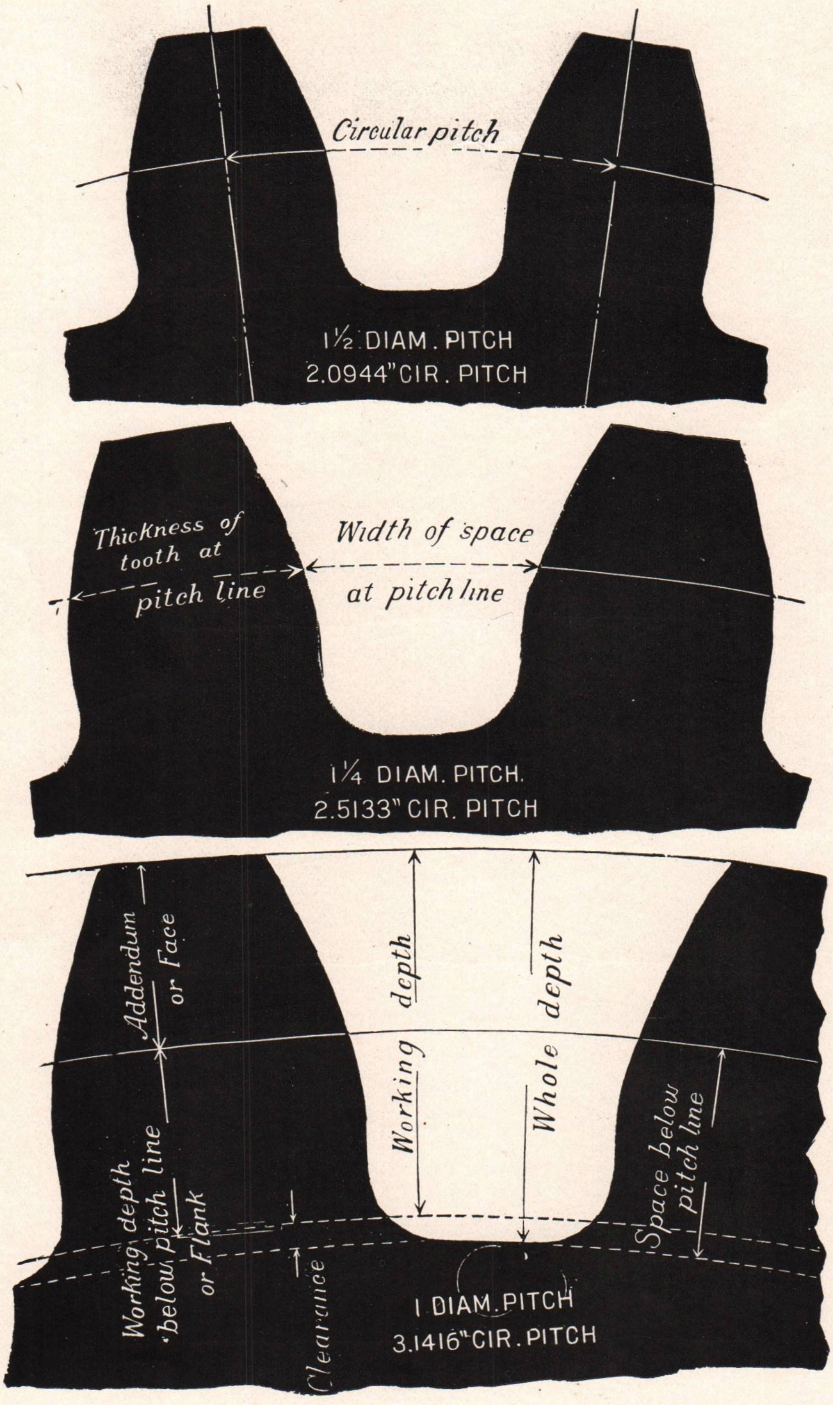

Circular pitch
1½ DIAM. PITCH
2.0944" CIR. PITCH
Thickness of tooth at pitch line
Width of space at pitch line
1¼ DIAM. PITCH.
2.5133" CIR. PITCH
Addendum or Face
Working depth
Whole depth
Space below pitch line
Working depth below pitch line or Flank
Clearance
1 DIAM. PITCH
3.1416" CIR. PITCH

FIG. 054

GEAR LIST

ALL DIMENSIONS ARE GIVEN IN INCHES

MACHINE-CUT SPUR GEARS

Code Word	Pitch Diameter	Outside Diameter	Face	Diametral Pitch	No. of Teeth
Gaiter	2.14″	2.28″	1″	14	30
Gag	10.28″	10.42″	1″	14	144
Gab	5.5″	5.7″	⅝″	10	55
Gaby	9″	9.2″	1″	10	90
Gad	11.6″	11.8″	1″	10	116
Gadfly	12.4″	12.6″	1″	10	124
Gadling	13.4″	13.6″	1″	10	134
Gable	17.6″	17.8″	1″	10	176
Gadoid	5″	5¼″	2″	8	40
Gael	10¼″	10½″	¾″	8	82
Gaelic	13¼″	13½″	¾″	8	106
Gaff	18¼″	18½″	1⅞″	8	146
Gaffer	4.1428″	4.4285″	2″	7	29
Gafol	4.57″	4.86″	1″	7	32
Gaggle	5.1428″	5.4285″	2″	7	36
Gale	12″	12.285″	2″	7	84
Gagate	15.428″	15.714″	1″	7	108
Gall	16″	16.285″	2″	7	112
Galop	19.428″	19.714″	2″	7	136
Gager	60″	60.285″	8″	7	420
Game	6.5″	6.866″	1½″	6	39
Garnet	6.83″	7.16″	1½″	6	41
Gambol	7″	7.33″	1½″	6	42
Garb	40″	40.33″	3″	6	240
Gaily	2.6″	3″	3″	5	13
Gain	5″	5.4″	3″	5	25
Gaunt	5.4″	5.8″	2″	5	27
Gainer	5.4″	5.8″	3″	5	27
Gainful	7″	7.4″	3″	5	35
Gainless	12.8″	13.2″	1¼″	5	64
Gated	13.4″	13.8″	1¼″	5	67
Gaud	26.8″	27.2″	2½″	5	134
Gavel	28″	28.4″	3″	5	140
Gawk	40″	40.4″	3″	5	200
Gasp	48″	48.4″	3½″	5	240
Gainly	4″	4½″	3″	4	16
Gaze	9″	9½″	2″	4	36
Gender	14″	14½″	1″	4	56
Gem	16″	16½″	2½″	4	64
Gay	16″	16½″	4″	4	64
Gainsay	30″	30½″	3″	4	120
Gainst	35¼″	35¾″	3¾″	4	141
Gait	36″	36½″	3″	4	144
Galaxy	4″	4.66″	3″	3	12
Galen	4.66″	5.33″	3″	3	14
Galiot	5″	5.66″	3″	3	15
Gallant	5.66″	6.33″	4″	3	17
Galley	6″	6.66″	3″	3	18
Gallic	6″	6.66″	3½″	3	18
Gallert	6.33″	7″	3½″	3	19
Galore	6.66″	7.33″	3½″	3	20
Gambet	7″	7.66″	4″	3	21
Galvin	7″	7.66″	5″	3	21
Gamin	7.33″	8″	3″	3	22

We have the best facilities for making accurate, machine cut spur gears up to 12 feet diameter by 20-inch face.

MACHINE-CUT SPUR GEARS—CONTINUED

Code Word	Pitch Diameter	Outside Diameter	Face	Diametral Pitch	No. of Teeth
Gammon	7.66″	8.33″	3″	3	23
Gamy	8″	8.66″	3½″	3	24
Gan	8.33″	9″	5″	3	25
Gander	8.33″	9″	7″	3	25
Ganil	8.66″	9.33″	3″	3	26
Gannet	8.66″	9.33″	3½″	3	26
Gantlet	9″	9.66″	3″	3	27
Gantois	9.66″	10.33″	5″	3	29
Ganza	10″	10.66″	5″	3	30
Gapel	10.66″	11.33″	3″	3	32
Gape	12″	12.66″	3″	3	36
Garst	12.66″	13.33″	5″	3	38
Garb	13″	13.66″	4″	3	39
Garbel	13″	13.66″	5″	3	39
Garboil	13.66″	14.33″	3″	3	41
Gimp	14.33″	15″	5″	3	43
Gentle	16″	16.66″	4″	3	48
Giant	16.66″	17.33″	3″	3	50
Gard	18″	18.66″	3″	3	54
Geth	20″	20.66″	3″	3	60
Gare	24″	24.66″	2⅜″	3	72
Genus	28″	28.66″	4″	3	84
Gild	30″	30.66″	3″	3	90
Garget	30″	30.66″	5″	3	90
Gargle	32″	32.66″	5″	3	96
Garish	32.33″	33″	4″	3	97
Garland	33.33″	34″	3¾″	3	100
Gig	34″	34.66″	4″	3	102
Germ	34″	34.66″	5″	3	102
Gaff	35″	35.66″	3½″	3	105
Gier	36″	36.66″	3½″	3	108
Gib	37″	37.66″	4″	3	111
Garlic	38″	38.66″	5″	3	114
Garner	39″	39.66″	3½″	3	117
Gim	39.33″	40″	3½″	3	118
Garnish	40″	40.66″	3″	3	120
Garous	40″	40.66″	3½″	3	120
Ghast	40″	40.66″	5″	3	120
Garran	46″	46.66″	5″	3	138
Garret	46″	46.66″	7″	3	138
Gite	6″	6.8″	3½″	2½	15
Garrot	6″	6.8″	5½″	2½	15
Garth	8.4″	9.2″	6½″	2½	21
Gire	9.2″	10″	3½″	2½	23
Gynne	10″	10.8″	4″	2½	25
Garum	10″	10.8″	6½″	2½	25
Gyrle	10.4″	11.2″	3½″	2½	26
Gash	10.4″	11.2″	4″	2½	26
Gin	11.6″	12.4″	6″	2½	29
Gaskin	12″	12.8″	5½″	2½	30
Gleas	14″	14.8″	5″	2½	35
Glean	14″	14.8″	8″	2½	35
Glady	16″	16.8″	5″	2½	40
Glance	16″	16.8″	6″	2½	40
Girse	18″	18.8″	3½″	2½	45
Gast	26.8″	27.6″	5½″	2½	67
Gastly	30″	30.8″	3″	2½	75
Gastric	30.4″	31.2″	5″	2½	76
Gird	34.4″	35.2″	3½″	2½	86
Glagol	36″	36.8″	4″	2½	90
Gipe	36.4″	37.2″	3½″	2½	91
Gatter	37.6″	38.4″	4″	2½	94
Gipsy	38″	38.8″	5½″	2½	95
Glen	42.4″	43.2″	5½″	2½	106
Glebe	43.2″	44″	5½″	2½	108
Glair	48″	48.8″	5″	2½	120
Gauche	49.2″	50″	6½″	2½	123
Glaux	54″	54.8″	8″	2½	135

We have the best facilities for making accurate, machine cut spur gears up to 12 feet diameter by 20-inch face.

MACHINE-CUT SPUR GEARS—CONTINUED

Code Word	Pitch Diameter	Outside Diameter	Face	Diametral Pitch	No. of Teeth
Gaul	56″	56.8″	5½″	2½	140
Glee	58″	58.8″	6″	2½	145
Gault	5½″	6½″	4⅜″	2	11
Glout	6½″	7½″	4½″	2	13
Glory	7½″	8½″	6″	2	15
Glim	8″	9″	5″	2	16
Glut	8½″	9½″	5″	2	17
Gavial	8½″	9½″	6″	2	17
Gavot	9″	10″	5″	2	18
Gawn	10½″	11½″	10″	2	21
Glisk	11″	12″	5″	2	22
Gazel	11″	12″	7″	2	22
Glogh	11″	12″	8″	2	22
Gazer	13″	14″	8″	2	26
Gazon	13½″	14½″	6″	2	27
Gloom	14½″	15½″	5½″	2	29
Glunch	15″	16″	7″	2	30
Glib	16″	17″	7″	2	32
Geck	17″	18″	6″	2	34
Gefle	17″	18″	8″	2	34
Geest	20½″	21½″	8″	2	41
Glub	22″	23″	5″	2	44
Geine	22″	23″	7″	2	44
Glode	23″	24″	8″	2	46
Glike	24″	25″	5″	2	48
Glint	36″	37″	5″	2	72
Glome	36″	37″	5½″	2	72
Gelert	38″	39″	4″	2	76
Gliff	38″	39″	5″	2	76
Gelly	38″	39″	6″	2	76
Gloat	40″	41″	4½″	2	80
Glose	41″	42″	6″	2	82
Gelt	43½″	44½″	6″	2	87
Gemel	48½″	49½″	6″	2	97
Gemini	52½″	53½″	8″	2	105
Gemma	54″	55″	6″	2	108
Glum	54″	55″	7″	2	108
Generic	54″	55″	10″	2	108
Genet	56″	57″	8″	2	112
Glide	58″	59″	6″	2	116
Gley	58″	59″	7″	2	116
Genie	58″	59″	10″	2	116
Genre	59″	60″	8″	2	118
Gent	60″	61″	6″	2	120
Gentil	63″	64″	5″	2	126
Gentoo	5.72″	6.86″	6″	1¾	10
Gentry	10.28″	11.42″	6½″	1¾	18
Geode	16″	17.33″	5″	1½	24
Gerant	29.33″	30.66″	8″	1½	44
Gest	48″	49.33″	5″	1½	72
Gestic	13.6″	15.2″	8″	1¼	17
Gestor	14.4″	16″	8″	1¼	18
Getim	15.2″	16.8″	12″	1¼	19
Glyph	17.6″	19.2″	4″	1¼	22
Ghat	17.6″	19.2″	8″	1¼	22
Gnash	19.2″	20.8″	7½″	1¼	24
Gheber	19.2″	20.8″	10″	1¼	24
Gibbe	20″	21.6″	12″	1¼	25
Gibbon	21.6″	23.2″	8″	1¼	27
Gnar	22.4″	24″	7½″	1¼	28
Giber	65.6″	67.2″	8″	1¼	82
Glyn	67.2″	68.8″	4″	1¼	84
Gnap	68″	69.6″	7½″	1¼	85
Giblet	77.6″	79.2″	8″	1¼	97
Gluy	80″	81.6″	8″	1¼	100
Giddy	80″	81.6″	10″	1¼	100
Giful	84.8″	86.4″	12″	1¼	106
Gigget	86.4″	88″	12″	1¼	108

We have the best facilities for making accurate, machine cut spur gears up to 12 feet diameter by 20-inch face.

CAST SPUR GEARS

Code Word	Pitch Diameter	Face	Circular Pitch	No. of Teeth
Gnaw	1.00″	¾″	5/16″	10
Gnede	1.19″	⅞″	5/16″	12
Gnide	2.19″	¾″	5/16″	22
Gnof	4.77″	¾″	5/16″	48
Gnome	15.62″	1″	⅜″	131
Gnu	2.51″	1¼″	7/16″	18
Goad	12.25″	13/16″	7/16″	88
Gob	3.03″	1″	½″	19
Goave	2.59″	1¾″	⅝″	13
Gumbo	2.62″	2″	11/16″	12
Gonel	2.62″	3½″	¾″	11
Gory	3.10″	1¾″	¾″	13
Gorge	3.82″	2″	¾″	16
Gopher	3.82″	2¼″	¾″	16
Gog	4.53″	1⅜″	¾″	19
Goif	8.83″	1⅜″	¾″	37
Gome	9.78″	1¾″	¾″	41
Goom	10.00″	2″	¾″	42
Gore	10.95″	2¼″	¾″	46
Goole	15.00″	2″	¾″	63
Gorce	21.92″	2¼″	¾″	92
Golf	25.80″	1½″	¾″	108
Gotch	2.84″	2″	13/16″	11
Gote	3.36″	2½″	13/16″	13
Gourd	2.78″	1⅞″	⅞″	10
Gout	3.90″	1¾″	⅞″	14
Grape	3.90″	2½″	⅞;	14
Grail	4.45″	1¾″	⅞″	16
Grane	4.45″	3¼″	⅞″	16
Gove	4.73″	1¾″	⅞″	17
Gow	5.02″	1¾″	⅞″	18
Goul	5.57″	1¾″	⅞″	20
Gowl	6.13″	1¾″	⅞″	22
Grab	11.95″	1¾″	⅞″	43
Grace	15.02″	1¾″	⅞″	54
Graff	21.41″	1¾″	⅞″	77
Grayn	29.00″	1¾″	⅞″	104
Grand	94.75″	1⅞″	⅞″	340
Graph	2.98″	2 3/16″	15/16″	10
Grange	4.48″	2½″	15/16″	15
Gree	3.51″	3¼″	1″	11
Grass	4.15″	2½″	1″	13
Grat	4.47″	2½″	1″	14
Gravel	5.43″	2½″	1″	17
Gravid	5.75″	3″	1″	18
Graze	6.06″	3½″	1″	19
Grebe	7.02″	2″	1″	22
Greave	15.93″	2″	1″	50
Giglot	18.11″	2½″	1″	57
Gilse	20.35″	2½″	1″	64
Grasp	25.50″	2″	1″	80
Greek	4.90″	2½″	1.1″	14
Greit	5.96″	3¼″	1.1″	17
Greet	8.40″	2½″	1.1″	24
Greeve	27.00″	2½″	1.1″	77
Grew	5.41″	6″	1 1/16″	16
Grias	3.59″	2½″	1⅛″	10
Grice	4.30″	3″	1⅛″	12
Gillet	4.91″	3¾″	1 3/16″	13

Code Word	Pitch Diameter	Face	Circular Pitch	No. of Teeth
Grith	4.38″	2⅝″	1¼″	11
Grill	4.78″	2½″	1¼″	12
Grise	8.36″	3″	1¼″	21
Gride	8.76″	3″	1¼″	22
Groff	9.95″	3″	1¼″	25
Grist	9.95″	4½″	1¼″	25
Grilse	11.93″	2½″	1¼″	30
Grim	13.93″	2½″	1¼″	35
Griff	13.93″	3″	1¼″	35
Grivet	15.13″	2¼″	1¼″	38
Groan	17.12″	2¼″	1¼″	43
Gimbal	17.92″	2½″	1¼″	45
Grocer	19.11″	2½″	1¼″	48
Grison	19.91″	3″	1¼″	50
Grig	22.30″	2½″	1¼″	56
Grin	35.92″	2½″	1¼″	90
Gripe	48.20″	2½″	1¼″	121
Gruff	12.53″	3″	1 5/16″	30
Gruel	21.75″	3″	1 5/16″	52
Groin	5.73″	2½″	1½″	12
Groom	6.20″	3½″	1½″	13
Grope	8.12″	4″	1½″	17
Grudge	8.59″	4½″	1½″	18
Grog	9.07″	2½″	1½″	19
Gimmal	9.55″	4¾″	1½″	20
Gros	10.02″	4″	1½″	21
Growl	10.02″	5″	1½″	21
Grow	10.50″	5″	1½″	22
Grub	11.93″	3⅛″	1½″	25
Ging	11.93″	4¼″	1½″	25
Grot	13.38″	4″	1½″	28
Grozet	15.28″	3⅛″	1½″	32
Grouse	24.28″	3½″	1½″	51
Groot	32.00″	3½″	1½″	67
Gromel	32.00″	2½″	1½″	67
Grove	33.42″	3¼″	1½″	70
Grout	40.10″	4″	1½″	84
Girdet	55.80″	4½″	1½″	117
Grum	11.81″	3½″	1 11/16″	22
Gue	5.57″	6″	1¾″	10
Gry	7.80″	4″	1¾″	14
Guaco	8.92″	4½″	1¾″	16
Guano	10.02″	4½″	1¾″	18
Guelph	15.04″	7″	1¾″	27
Guava	30.10″	4½″	1¾″	54
Grumph	35.66″	4″	1¾″	64
Gryde	48.50″	4″	1¾″	87
Goth	48.50″	4¼″	1¾″	87
Guffer	14.32″	5½″	1⅞″	24
Guest	32.85″	5″	1⅞″	55
Guhr	35.80″	5½″	1⅞″	60
Guild	7.64″	4″	2″	12
Gula	7.64″	4½″	2″	12
Gunda	8.91″	4½″	2″	14
Gunnel	9.55″	4½″	2″	15
Gut	9.55″	5″	2″	15
Gull	10.18″	4½″	2″	16
Guinea	11.45″	4½″	2″	18
Gust	12.10″	6½″	2″	19
Gulf	16.54″	4½″	2″	26
Gurmy	16.54″	6″	2″	26
Gunter	19.72″	4½″	2″	31
Guise	21.63″	4½″	2″	34
Gulch	26.10″	4½″	2″	41
Guydon	31.82″	6″	2″	50
Gump	49.00″	4½″	2″	77

CAST SPUR GEARS—CONTINUED

Code Word	Pitch Diameter	Face	Circular Pitch	No. of Teeth
Gush	58.55″	6″	2″	92
Guns	96.75″	4½″	2″	152
Gusto	109.40″	4″	2″	172
Gurt	121.00″	6¼″	2″	190
Gutta	12.18″	4½″	2⅛″	18
Girn	13.54″	8″	2⅛″	20
Gyroma	10.02″	7″	2¼″	14
Gymnic	10.73″	6½″	2¼″	15
Gylte	10.73″	8⅜″	2¼″	15
Gybe	11.46″	5″	2¼″	16
Gyrus	12.89″	6¾″	2¼″	18
Habit	18.63″	5″	2¼″	26
Gyte	24.35″	8″	2¼″	34
Gyall	58.05″	5″	2¼″	81
Haaf	60.95″	8″	2¼″	85
Gyre	65.20″	6½″	2¼″	91
Hachel	144.20″	6¼″	2 7/16″	186
Hack	12.72″	4″	2½″	16
Haik	12.72″	7½″	2½″	16
Habile	12.72″	9″	2½″	16
Halo	15.91″	6½″	2½″	20
Halk	21.48″	7½″	2½″	27
Hamal	21.48″	8″	2½″	27
Hame	47.75″	7½″	2½″	60
Hadena	76.45″	6½″	2½″	96
Haft	78.0″	6 13/16″	2½″	98
Hades	89.1″	6½″	2½″	112
Hag	100.3″	6½″	2½″	126
Hake	108.2″	7½″	2½″	136
Halm	109.0″	7½″	2½″	137

Code Word	Pitch Diameter	Face	Circular Pitch	No. of Teeth
Hance	48.95″	7½″	2 9/16″	60
Hansel	11.91″	7¼″	2 11/16″	14
Hank	51.10″	7″	2 11/16″	60
Hap	16.63″	8″	2¾″	19
Hardy	52.55″	7″	2¾″	60
Hare	72.70″	8″	2¾″	83
Hash	15.28″	9″	3″	16
Harn	18.15″	7½″	3″	19
Haust	20.05″	9″	3″	21
Harrow	21.97″	7½″	3″	23
Hatch	29.60″	9″	3″	31
Haugh	44.90″	9″	3″	47
Haunch	78.40″	7½″	3″	82
Harsh	111.70″	7½″	3″	117
Haut	24.84″	6″	3¼″	24
Haven	15.60″	10¾″	3½″	14
Havoc	24.54″	10″	3½″	22
Haw	44.60″	10″	3½″	40
Haze	17.82″	11″	4″	14
Heal	21.65″	12½″	4″	17
Hawk	125.0″	10½″	4″	98

CAST SPUR GEARS—FINGER TOOTH

Code Word	Pitch Diameter	Outside Diam.	Face	Circular Pitch	No. of Teeth
Heben	14.32″	16.5″	4″	3″	15
Heark	15.28″	18″	4″	3″	16
Heave	16.23″	19″	4″	3″	17
Heft	18.14″	20¼″	4″	3″	19
Hector	19.10″	21½″	5″	3″	20
Helm	20.02″	22¼″	5″	3″	21
Heck	21.98″	24¼″	4″	3″	23
Helver	22.91″	25¼″	5″	3″	24
Heir	23.86″	26″	5″	3″	25
Helio	24.81″	27″	5″	3″	26
Hedge	27.70″	30″	5″	3″	29
Henna	21.75″	24″	5″	3¼″	21
Hepar	22.80″	33″	6″	3¼″	22

Code Word	Pitch Diameter	Outside Diam.	Face	Circular Pitch	No. of Teeth
Herald	22.30″	27″	5″	3½″	20
Herman	23.40″	26″	5″	3½″	21
Hermes	25.62″	28¼″	5″	3½″	23
Herls	26.75″	29½″	5″	3½″	24
Herie	26.75″	29½″	5″	3½″	25
Herb	29.00″	31½″	5″	3½″	26
Heron	24.20″	27″	6″	4″	19
Herpes	25.46″	28¼″	6″	4″	20
Hester	31.82″	35″	6″	4″	25
Hexane	33.10″	36¾″	6″	4″	26
Hevea	35.65″	39″	6″	4″	28
Herse	39.46″	42½″	6″	4″	31

CAST BEVEL GEARS AND MATES

Code Word	Pitch Diameter	Face	Circular Pitch	No. of Teeth
Hilar	4.14″	1″	13/32″	32
Hick	4.92″	1″	13/32″	38
Hine	4.06″	1½″	¾″	17
Hindu	8.12″	1½″	¾″	34
Hinch	3.73″	1 11/16″	25/32″	15
Hilum	8.21″	1 11/16″	25/32″	33
Hircus	3.91″	1½″	⅞″	14
Hippo	8.10″	1½″	⅞″	29
Hispid	7.53″	2¼″	⅞″	27
Hirudo	9.48″	2¼″	⅞″	34
Hoar	13.39″	2″	⅞″	48
Hive	40.20″	2″	⅞″	144
Halet	5.10″	2″	1″	16
Hart	8.60″	2″	1″	27
Hobo	5.10″	2½″	1″	16
Hobby	15.29″	2½″	1″	48
Hocus	5.42″	2″	1″	17
Hockle	9.88″	2″	1″	31
Halse	6.06″	2½″	1″	19
Halm	18.15″	2½″	1″	57
Hodge	6.06″	3¼″	1″	19
Hoddy	18.15″	3¼″	1″	57
Hoyden	7.18″	2¾″	1⅛″	20
Hoful	14.00″	2¾″	1⅛″	39
Hoker	12.19″	3″	1⅛″	34
Holcad	15.06″	3″	1⅛″	42
Homage	6.78″	3½″	1¼″	17
Holy	35.85″	3½″	1¼″	90
Hoof	7.97″	2¾″	1¼″	20
Honor	23.90″	2¾″	1¼″	60
Holm	7.97″	4″	1¼″	20
Holer	31.85″	4″	1¼″	80

Code Word	Pitch Diameter	Face	Circular Pitch	No. of Teeth
Hop	8.77″	3″	1¼″	22
Hoodoo	20.32″	3″	1¼″	51
Honey	9.17″	3½″	1¼″	23
Homer	29.87″	3½″	1¼″	75
Hornet	5.74″	4″	1½″	12
Horia	33.00″	4″	1½″	69
Hulen	6.70″	2½″	1½″	14
Hulch	21.50″	2½″	1½″	45
Hortia	6.70″	3½″	1½″	14
Horrid	30.10″	3½″	1½″	63
Horde	8.13″	4″	1½″	17
Horal	22.95″	4″	1½″	48
Huggle	7.95″	3″	1 9/16″	16
Hudson	15.90″	3″	1 9/16″	32
Hosea	11.92″	4″	1 9/16″	24
Horus	23.84″	4″	1 9/16″	48
Houk	12.25″	4½″	1¾″	22
Houff	25.10″	4½″	1¾″	45
Houdah	12.25″	4¼″	1¾″	22
Host	36.22″	4¼″	1¾″	65
Houry	16.11″	4½″	1⅞″	27
Hound	32.22″	4½″	1⅞″	54
Hovel	12.10″	4¾″	2″	19
Hove	59.80″	4¾″	2″	94
Hanna	12.72″	6″	2″	20
Hanap	42.00″	6″	2″	66
Hansa	13.38″	5″	2″	21
Hansom	33.12″	5″	2″	52
Hoya	15.12″	6½″	2½″	19
Howk	61.30″	6½″	2½″	77

CAST MITRE GEARS

Code Word	Pitch Diameter	Face	Circular Pitch	No. of Teeth
Humus	3.11″	¾″	13/32″	24
Holst	10.01″	2″	⅞″	36
Humble	5.10″	1½″	1″	16
Hulver	14.64″	2½″	1″	46
Human	14.96″	2½″	1″	47
Humic	15.92″	3″	1″	50
Humbuz	16.23″	3″	1″	51

Code Word	Pitch Diameter	Face	Circular Pitch	No. of Teeth
Humet	12.33″	3″	1¼″	31
Hundi	17.20″	3½″	1½″	36
Hunger	12.25″	3″	1¾″	22
Hummer	23.95″	4¼″	1¾″	43
Hump	34.40″	8″	2¼″	48

CAST WORM GEARS

Code Word	Pitch Diameter	Face	Circular Pitch	No. of Teeth	Hand
Harun	21.00″	2¾″	1″	66	R. H.
Harass	21.00″	2¾″	1″	66	L. H.
Hussar	53.50″	3″	1½″	112	R. H.
Hush	31.21″	4½″	2″	49	R. H.

CAST WORMS

Code Word	Pitch Diameter	Pitch	Hand
Hark	3⅜″	1″	L. H.
Hut	6″	1½″	R. H.
Harth	6″	2″	R. H.
Harl	7.228″	2″	R. H.

CUT WORM GEARS

Code Word	Pitch Diameter	Outside Diameter	Face	Pitch	No. of Teeth	Hand
Harm	14.93″	15.125″	1⅛″	¼″	188	R. H.
Harp	14.93″	15.125″	1⅛″	¼″	188	L. H.
Harpist	4.46″	4.91″	1″	½″	28	L. H.
Harpy	4.77″	5.125″	1⅛″	½″	30	R. H.
Harrot	4.77″	5.125″	1⅛″	½″	30	L. H.
Hartal	14.98″	15.187″	1⅛″	½″	94	R. H.
Harten	14.98″	15.187″	1⅛″	½″	94	L. H.
Hutton	17.98″	18.312″	1¾″	½″	113	L. H.
Hastive	13.36″	13.84″	2¾″	¾″	56	R. H.
Hathe	25.12″	26.56″	3⅜″	1¼″	63	R. H.
Hatted	38.20″	40.25″	5″	2″	60	R. H.

CAST INTERNAL SPUR GEARS

Code Word	Pitch Diameter	Face	Circular Pitch	No. of Teeth
Hybrid	60.07″	4½″	1½″	127
Hydra	119.4″	4¼″	2½″	150

CAST ELLIPTICAL SPUR GEARS

Code Word	Major Pitch Diameter	Minor Pitch Diameter	Face	Circular Pitch	No. of Teeth
Hyphen	12⅝″	9¼″	2¼″	¾″	46
Hyena	29″	11¾″	2¼″	¾″	92

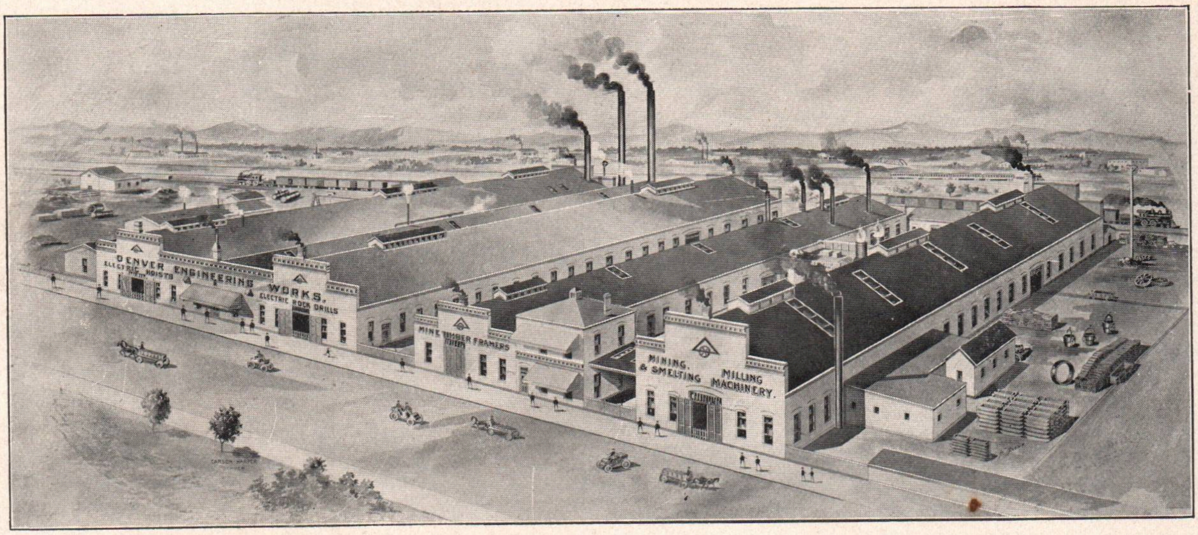
DIMENSIONS FOR DENVER ENGINEERING WORKS CO.

STANDARD KEYWAYS AND STANDARD FEATHERWAYS

Size of Shaft	Width of Keyway	Depth of Keyway in Shaft	Depth of Keyway in Hub, Deep Side	Depth of Featherway in Shaft	Depth of Featherway in Hub
1″	1/4″	5/64″	5/32″	7/64″	5/32″
1 1/16″	1/4″	5/64″	5/32″	7/64″	5/32″
1 1/8″	1/4″	5/64″	5/32″	7/64″	5/32″
1 3/16″	5/16″	5/64″	5/32″	7/64″	7/32″
1 1/4″	5/16″	5/64″	5/32″	7/64″	7/32″
1 7/16″	3/8″	7/64″	3/16″	9/64″	1/4″
1 11/16″	7/16″	9/64″	7/32″	11/64″	9/32″
1 15/16″	1/2″	9/64″	9/32″	11/64″	11/32″
2 3/16″	1/2″	9/64″	9/32″	11/64″	11/32″
2 7/16″	5/8″	13/64″	11/32″	15/64″	13/32″
2 11/16″	5/8″	13/64″	11/32″	15/64″	13/32″
2 15/16″	3/4″	15/64″	7/16″	17/64″	1/2″
3 3/16″	3/4″	15/64″	7/16″	17/64″	1/2″
3 7/16″	7/8″	19/64″	1/2″	21/64″	9/16″
3 15/16″	1″	23/64″	9/16″	25/64″	5/8″
4 7/16″	1″	23/64″	9/16″	25/64″	5/8″
4 7/8″	1 1/8″	27/64″	9/16	33/64″	5/8
5 1/2″	1 3/8″	31/64″	3/4″	41/64″	3/4″

Our standard keys are approximately one-quarter the diameter of the shaft in width, and square at the large end. The taper is 3/16 inch to the foot.

DENVER ENGINEERING WORKS.



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